What is claimed is:

1. An ultra-low carbon steel having a chemical composition including, in mass percent, C: at most 0.010%, Si: at most 0.5%, Mn: at most 1.5%, P: at most 0.12%, S: at most 0.030%, Al: at most 0.080%, N: at most 0.0080%, one or both of Ti: at most 0.10% and Nb: at most 0.05%, B: 0 – 0.0050%, V: 0 – 0.05%, Ca: 0 – 0.0050%, and at most 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components, wherein the total number of non-metallic inclusions observed in 60 fields under a microscope in a sample of the steel prepared in accordance with JIS G0555 is at most 20.

2. An ultra-low carbon steel as claimed in claim 1 wherein the chemical composition further includes B: at most 0.0050%.

3. An ultra-low carbon steel as claimed in claim 1 wherein the chemical composition further includes V: at most 0.05%.

4. An ultra-low carbon steel as claimed in claim 2 wherein the chemical composition further includes V: at most 0.05%.

5. An ultra-low carbon steel as claimed in claim 1 wherein the chemical composition further includes Ca: at most 0.0050%.

6. An ultra-low carbon steel as claimed in claim 2 wherein the chemical composition further includes Ca: at most 0.0050%.

7. An ultra-low carbon steel as claimed in claim 3 wherein the chemical composition further includes Ca: at most 0.0050%.

8. An ultra-low carbon steel as claimed in claim 4 wherein the chemical composition further includes Ca: at most 0.0050%.

9. An ultra-low carbon steel as claimed in claim 1 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

10. An ultra-low carbon steel as claimed in claim 2 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

11. An ultra-low carbon steel as claimed in claim 3 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

12. An ultra-low carbon steel as claimed in claim 4 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

13. An ultra-low carbon steel as claimed in claim 5 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

14. An ultra-low carbon steel sheet made of a steel having a chemical composition including, in mass percent, C: at most 0.010%, Si: at most 0.5%, Mn: at most 1.5%, P: at most 0.12%, S: at most 0.030%, Al: at most 0.080%, N: at most 0.0080%, one or both of Ti: at most 0.10% and Nb: at most 0.05%, B: 0 - 0.0050%, V: 0 – 0.05%, Ca: 0 – 0.0050%, and at most 0.1% of each of Cu, Cr,

Sn, and Sb as unavoidable components, wherein the total number of non-metallic inclusions observed in 60 fields under a microscope in a sample of the steel prepared in accordance with JIS G0555 is at most 20.

15. An ultra-low carbon steel sheet as claimed in claim 14 wherein the chemical composition further includes B: at most 0.0050%.

16. An ultra-low carbon steel sheet as claimed in claim 14 wherein the chemical composition further includes V: at most 0.05%.

17. An ultra-low carbon steel sheet as claimed in claim 15 wherein the chemical composition further includes V: at most 0.05%.

18. An ultra-low carbon steel sheet as claimed in claim 14 wherein the chemical composition further includes Ca: at most 0.0050%.

19. An ultra-low carbon steel sheet as claimed in claim 15 wherein the chemical composition further includes Ca: at most 0.0050%.

20. An ultra-low carbon steel sheet as claimed in claim 16 wherein the chemical composition further includes Ca: at most 0.0050%.

21. An ultra-low carbon steel sheet as claimed in claim 17 wherein the chemical composition further includes Ca: at most 0.0050%.

22. An ultra-low carbon steel sheet as claimed in claim 14 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

23. An ultra-low carbon steel sheet as claimed in claim 15 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

24. An ultra-low carbon steel sheet as claimed in claim 16 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

25. An ultra-low carbon steel sheet as claimed in claim 17 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

26. An ultra-low carbon steel sheet as claimed in claim 18 wherein the chemical composition further includes a maximum of 0.1% of each of Cu, Cr, Sn, and Sb as unavoidable components.

27. A method of manufacturing an ultra-low carbon steel sheet in which molten steel having a chemical composition including, in mass percent, C: at most 0.010%, Si: at most 0.5%, Mn: at most 1.5%, P: at most 0.12%, S: at most 0.030%, Al: at most 0.080%, N: at most 0.0080%, one or both of Ti: at most 0.10% and Nb: at most 0.05%, B: 0 - 0.0050%, V: 0 – 0.05%, and Ca: 0 – 0.0050% is subjected to refining in a converter, secondary refining after refining in the converter, continuous casting, and then hot rolling, wherein at the time of the secondary refining, the molten steel is tapped into a refining vessel, a vacuum immersion pipe having an interior that can be adjusted to a negative pressure is immersed in the molten steel in the refining vessel, and a stirring gas is blown into the molten steel.

28. A manufacturing method for an ultra-low carbon steel sheet as claimed in claim 27 wherein the amount of FeO + MnO in the slag in the refining vessel is at most 15 mass %, and the throughput at the time of casting is at most 5 tons per minute.

29. A manufacturing method for an ultra-low carbon steel sheet as claimed in claim 27 wherein the hot rolling of a slab obtained by the continuous casting is commenced after making the average temperature of the slab at least 1100°C, the finishing temperature of hot rolling is made at least the Ar_3 point, and the coiling temperature is made 450 – 750°C.

30. A manufacturing method for an ultra-low carbon steel sheet as claimed in claim 29 wherein in the hot rolling, heating or temperature holding process for a short period of time is carried out after rough rolling, and the finishing temperature of hot rolling is made at least the Ar_3 point over the entire length of a hot rolled coil.

31. A method of manufacturing an ultra-low carbon steel sheet as claimed in claim 27 wherein the obtained hot rolled steel sheet is subjected to descaling, cold rolling with a reduction of at least 45%, and annealing, with soaking being carried out at a temperature of at least 650°C when the annealing treatment is batch annealing and at a temperature of at least 750°C when the annealing treatment is continuous annealing, and then temper rolling is carried out.

32. A method of manufacturing an ultra-low carbon steel sheet as claimed in claim 28 wherein the obtained hot rolled steel sheet is subjected to descaling, cold rolling with a reduction of at least 45%, and annealing, with soaking being carried out at a temperature of at least 650°C when the annealing treatment is

batch annealing and at a temperature of at least 750°C when the annealing treatment is continuous annealing, and then temper rolling is carried out.

33. A method of manufacturing an ultra-low carbon steel sheet as claimed in claim 29 wherein the obtained hot rolled steel sheet is subjected to descaling, cold rolling with a reduction of at least 45%, and annealing, with soaking being carried out at a temperature of at least 650°C when the annealing treatment is batch annealing and at a temperature of at least 750°C when the annealing treatment is continuous annealing, and then temper rolling is carried out.

34. A method of manufacturing an ultra-low carbon steel sheet as claimed in claim 30 wherein the obtained hot rolled steel sheet is subjected to descaling, cold rolling with a reduction of at least 45%, and annealing, with soaking being carried out at a temperature of at least 650°C when the annealing treatment is batch annealing and at a temperature of at least 750°C when the annealing treatment is continuous annealing, and then temper rolling is carried out.